



INSTITUTE FOR DEFENSE ANALYSES

## **Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics**

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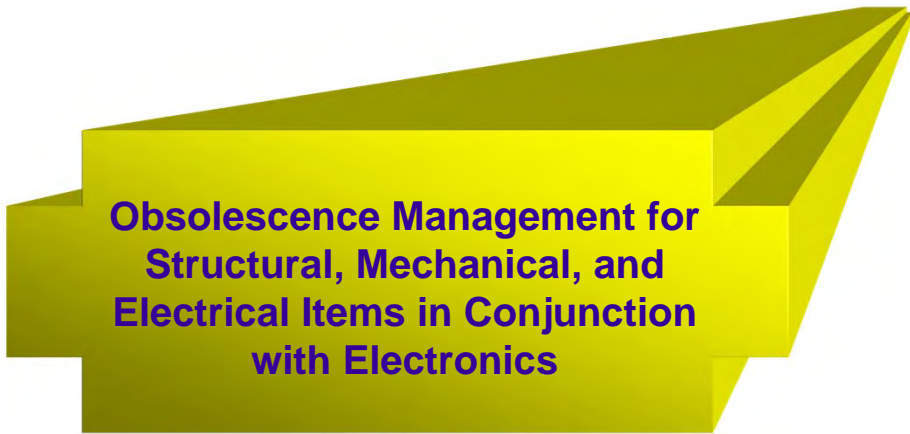
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**Obsolescence Management for Structural,  
Mechanical, and Electrical Items in Conjunction  
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**Jay Mandelbaum**

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## **Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics**

**International Institute of Obsolescence Management  
Conference  
Edinburgh, Scotland  
June 16-18, 2015**



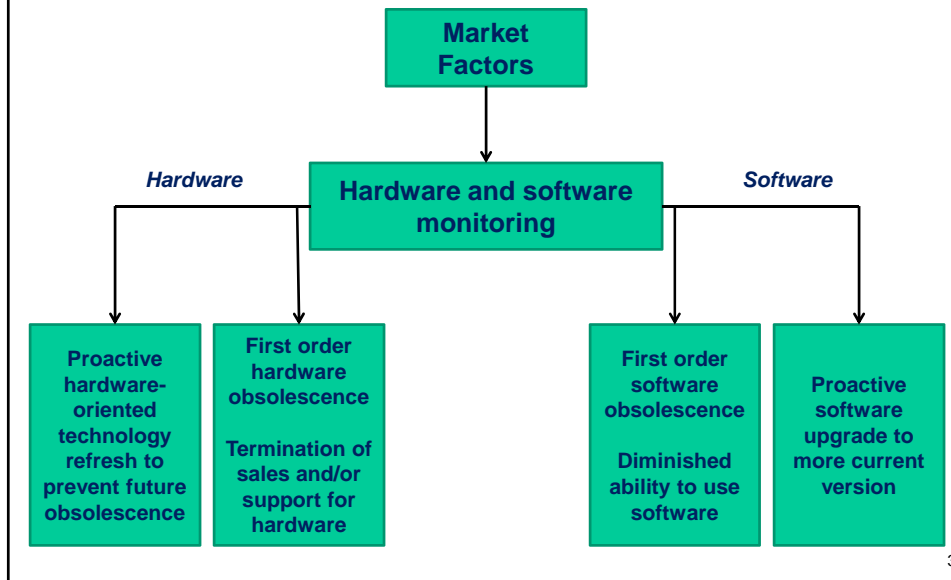
**Jay Mandelbaum  
Christina Patterson**

### **Overview**

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- **Scope**
  - Materials and mechanical items that are identified in a Bill of Materials (BOM), e.g.,—
    - Adhesives
    - Insulating Material
    - A Diesel Engine
    - A Fender
- **This presentation will address—**
  - Obsolescence mechanisms
  - Questions and decisions facing a program in determining—
    - To what extent to apply obsolescence management
    - When to start
  - A risk-based framework

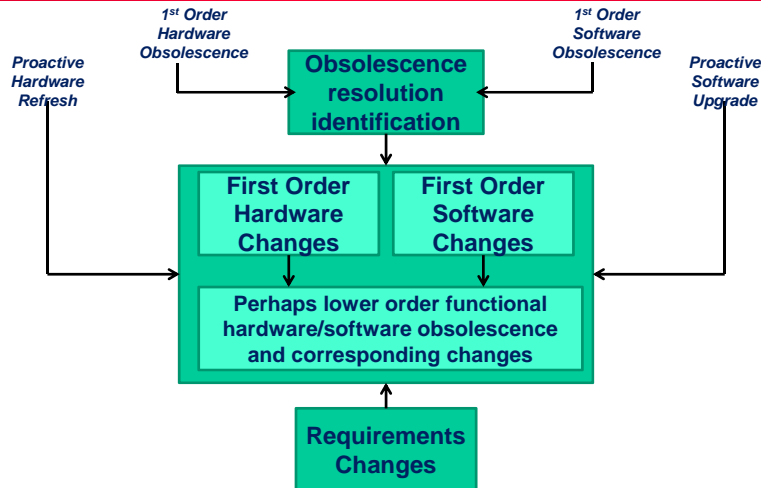
## Obsolescence Mechanisms (1 of 2)



## First Order Hardware Obsolescence Mechanisms for Materials and Mechanical Items

- **Use of hazardous materials**
  - May become unavailable or hard to get (e.g., Freon)
- **The supplier goes out of business**
  - Not financially viable
- **The supplier's business case is no longer viable**
  - Tungsten rhenium wire or some exotic material
- **Use of supply-constrained materials**
  - Supply limited by regulation or supplier policy
- **The tooling is no longer available**

## Obsolescence Mechanisms (2 of 2)

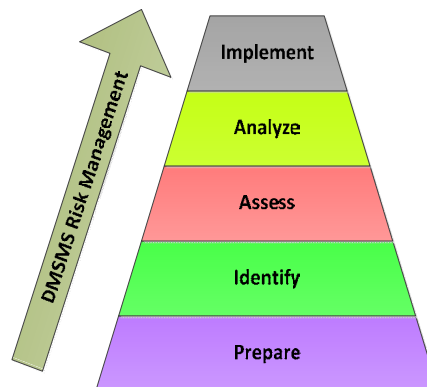


Materials and mechanical items obsolescence mechanisms are similar to electronic items, but product life-cycle time is longer

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## Obsolescence Management Overview

- **Prepare:** Establishment of a obsolescence management program infrastructure
- **Identify:** Obsolescence monitoring and surveillance
- **Assess:** Obsolescence impact assessment
- **Analyze:** Resolution determination
- **Implement:** Implementation of obsolescence resolutions



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## **Prepare: Establishing Strategic Underpinnings**

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- **Two questions to be answered by program management**
  - To what extent should a program apply obsolescence management to materials (including critical materials\* in the supply chain) and mechanical items?
  - When should a program's efforts begin in these areas?

\* Critical materials include hazardous, exotic, and supply-constrained materials

**Responses to these questions assume that resources are constrained and a risk-based approach should be pursued**

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## **Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (1 of 3)**

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- **Two elements of prioritization**
  - **Prioritize the systems/sub-systems of interest**
    - No changes to strategic underpinnings when mechanical items and materials are considered
  - **Determine the items (including critical materials in the supply chain) in the sub-systems of interest to be monitored**
    - This is where strategic underpinnings for monitoring materials and mechanical items (and electronic items too) should be explicitly considered

**Three determinations should be made when establishing strategic underpinnings; two of which apply to materials and mechanical items identified in a BOM**

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## **Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (2 of 3)**

- Determine the items (including critical materials in the supply chain) in the sub-systems of interest to be monitored
  - Items that are listed in a BOM
    1. Determine the heuristic algorithms to use to identify the families of materials and mechanical items (and electronics too) to definitely monitor
    2. Determine whether to further analyze uncategorized items
  - Critical materials that appear in lower level tiers of the items listed on the system's BOM
    3. Determine whether to investigate critical materials in the supply chain

Ultimately, program management must decide whether or not resources should be applied to obsolescence management to reduce risk to an acceptable level

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## **Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (3 of 3)**

- Determine when obsolescence management effort for materials and mechanical items (including critical materials in the supply chain) should begin
  - Early monitoring provides—
    - A larger window of opportunity to do something about an issue
    - The availability of a larger selection of less expensive resolutions
    - A smaller likelihood of schedule or readiness impacts
  - Only high risk materials and mechanical items are monitored; if the risk is high, proactive monitoring should begin early in the life cycle
  - Material and mechanical item monitoring is integrated with electronics item monitoring
  - Designs containing high risk materials or mechanical items can be revised before it is much more costly to make changes later

**BEST PRACTICE:**  
Begin proactive obsolescence management for materials and mechanical items at the same time as for electronic items

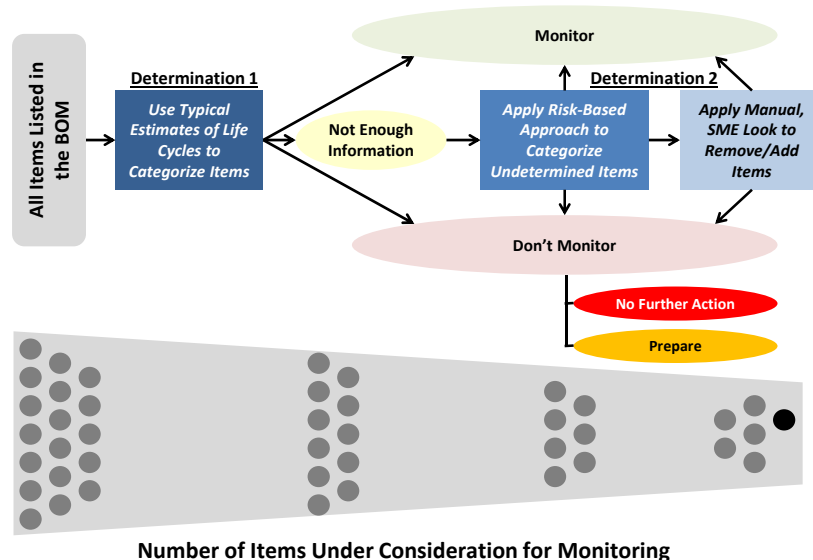
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## Identify: Two Different Approaches

- **Materials and mechanical items (and electronics items too) that are listed in a BOM**
  - Applies to the first two determinations from the strategic underpinnings on what to monitor
    1. Apply the heuristic algorithms to identify the items to definitely monitor
    2. Further analyze (as appropriate) uncategorized items where the heuristics did not provide a definitive answer
      - There are other potential benefits for the program
- **Critical materials that appear in lower level tiers of the system**
  - Applies to the third determination from the strategic underpinnings on what to monitor
    3. Investigate how critical materials in the supply chain or in a manufacturing process may alter the status of items being proactively monitored

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## Identify: Item Data Preparation Overview



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## Identify: Framework for a Risk-Based Approach— *Determination 1* (1 of 2)

- Apply heuristic algorithms to categorize the items as—
  - *Definitely monitor*: Item types with a high propensity for obsolescence issues, e.g.,—
    - Electronic COTS assemblies (e.g., networking gear, computers, active components, radiofrequency components, programmables, memory, microprocessors, ASICs, hybrids, and custom electronic assemblies)
    - Sole-source items that are in low demand
    - Custom passive items
    - Materials with chemical properties that are a function of the design, are sole source, or otherwise threaten the environment
    - Electro-mechanical items
  - *Don't Monitor*: Item types that are standard industrial items, e.g.,—
    - Mechanical components
    - Connectors
    - Cabling
    - Consumables
  - *Not enough information to determine whether to monitor*

Results in an initial categorization of items listed in the BOM

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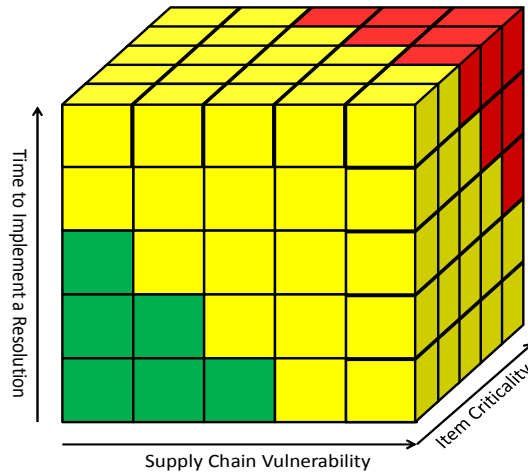
## Identify: Framework for a Risk-Based Approach— *Determination 1* (2 of 2)

- Options for deciding what to do about the uncategorized items from Determination 1
  - Monitor ALL uncategorized items (Low risk, High monitoring cost)
  - Conduct further analysis of uncategorized items to determine what to monitor; Commence Determination 2
  - Do not monitor any uncategorized items (High risk, Low monitoring cost)

**BEST PRACTICE:**  
The middle option—Optimizes risk and monitoring cost, but there are start-up expenses

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## Identify: Framework for a Risk-Based Approach— *Determination 2* (1 of 3)



Where is proactive monitoring of uncategorized items important?

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## Identify: Framework for a Risk-Based Approach— *Determination 2* (2 of 3)

Item Criticality	Supply Chain Vulnerability	Time to Implement Resolution
<ul style="list-style-type: none"> <li>• Critical safety item</li> <li>• Mission criticality</li> <li>• Item essentiality code</li> <li>• High demand (perhaps 10%)</li> <li>• High cost</li> </ul>	<ul style="list-style-type: none"> <li>• Source related</li> <li>• Financial health of supplier</li> <li>• Persistent backorders (over period of time)</li> <li>• Long customer wait-time (perhaps top 10%)</li> <li>• Recent significant price increase</li> <li>• Time since last order (perhaps if more than 3 years)</li> <li>• Low demand</li> <li>• Life cycle of the item</li> </ul>	<ul style="list-style-type: none"> <li>• TDP availability for mechanical item or availability of material specification for engineered material</li> <li>• Source controlled</li> <li>• Manufacturing difficulty</li> <li>• Long lead time to requalify</li> <li>• Manufacturing cycle time</li> <li>• Availability of tooling and test equipment</li> <li>• Cost to implement resolution</li> <li>• Defense unique</li> </ul>

Apply the risk cube to determine those previously uncategorized items that are high risk; this is where the principal start-up expenses would be incurred

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## Identify: Framework for a Risk-Based Approach— *Determination 2* (3 of 3)

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- Manually adjust the “Monitor” and “Don’t Monitor” lists, based on—
  - An assessment of considerations that are not available from an automated database
  - Any known vulnerabilities, such as items on the platform:
    - That members of the DMT know to be a problem
    - Where there are pending environmental or safety regulations that may limit their availability and use in any area of the world where the system operates

Could apply whether or not the risk cube is conducted

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## Identify: Analysis of Item Availability

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- Most predictive tools do not cover materials and mechanical items; product discontinuation notices are also not usually issued in these cases
- Therefore, for materials and mechanical items on the “Definitely Monitor” list—
  - Conduct research and/or vendor surveys to identify any issues
  - No need to modify content of vendor surveys in use today
  - Determine the appropriate frequency of vendor surveys for materials and mechanical items, based on a function of obsolescence risk, resources, and criticality/safety

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## Assess

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- **Should a resolution to the problem be pursued?**
  - Compare days of supply with expected time to implement a resolution
    - If item is obsolete, comparison will identify whether resolution can be deferred or not
    - If the item is not obsolete and the time for a resolution is long, as appropriate, increase the on-hand inventory (and maintain at a higher level) or take action to reduce the time to realize a resolution
- **Which problem should be addressed first?**
  - To include consideration as to whether a problem is a common issue that will be addressed by an external organization
- **At what level should a resolution be applied?**

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## Analyze

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- **For issues being addressed by an external organization, the program only needs to monitor that the resolution remains on track**
- **The same resolution types apply**
  - No solution required
  - Approved part
  - Life of need buy
  - Repair, refurbishment, or reclamation
  - Extension of production or support
  - Simple substitute
  - Complex substitute
  - Development of a new item or source
  - Redesign – NHA
  - Redesign – complex/system replacement

**There may be a different distribution of resolution types**

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## Questions?

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